

PD11-04 CONVENTIONAL VERSUS COMPUTER ASSISTED STEREOSCOPIC ULTRASOUND NEEDLE GUIDANCE FOR RENAL ACCESS: A RANDOMIZED BENCH-TOP CROSSOVER TRIAL

Alexander Thomas, Jerry Thomas, Mohamed Keheila*,
Braden Mattison, Benjamin West, David Ruckle, Samuel Abourbih,
Reed Krause, Vi Dinh, D. Daniel Baldwin, D. Duane Baldwin, LOMA
LINDA, CA

INTRODUCTION AND OBJECTIVES: During urologic surgery, ultrasound (US) is an established method for needle guidance, but difficulty in visualizing the needle trajectory may add technical complexity to the procedure. Needle guidance systems may simplify these procedures. The purpose of this randomized bench-top crossover trial was to compare conventional ultrasound and a computer assisted stereoscopic needle guidance system for obtaining renal access and mass biopsy.

METHODS: Subjects were randomly assigned to target one structure in either a renal access or mass biopsy phantom using conventional or computer assisted US guidance (figure 1) in two crossover trials. Recorded outcomes included time to hit the designated target, number of successful trials, number of punctures, and number of course corrections. Participant demographics and opinions of the two ultrasound modalities were also obtained. Statistical analysis was performed using student t-test for numerical variables and the chi-square test for categorical variables. P value 0.05 was considered significant.

RESULTS: Of the 71 subjects enrolled in this study, 11 were attending physicians, 27 were residents, and 32 were medical students. The computer assisted system significantly shortened the access time between skin puncture and target contact compared to conventional US (79.4 vs. 51.1 s; $p=0.009$) respectively. Number of needle course corrections during computer assisted trials was significantly decreased compared to conventional US (0.48 vs. 2.53; $p<0.001$). There was no significant difference in the number of successful punctures between conventional US and computer assisted trials (1.90 vs. 1.71; $p=0.236$) respectively. Novice subjects were significantly faster with computer assisted US needle guidance (70 sec vs. 107 sec; $p<0.001$), while experienced ultra-sonographers trended towards faster overall performance with conventional US needle guidance (91 sec vs. 126 sec; $p=0.052$). Seventy-three percent of subjects preferred the computer assisted system over conventional ultrasound.

CONCLUSIONS: A computer assisted system has potential for improving patient safety during renal access and mass biopsy by reducing needle access time and course corrections, as well as making ultrasound guidance more available to a wider urologic audience.



Figure 1A. Computer-assisted US guidance system consists of the dual camera system attached at the top of the ultrasound probe.

Figure 1B. The A computer-assisted US guidance system monitor is mounted above the ultrasound machine.

Source of Funding: None

PD11-05 CONTRAST-ENHANCED ULTRASOUND AS A REPLACEMENT FOR FLUOROSCOPIC NEPHROSTOGRAM FOLLOWING PERCUTANEOUS NEPHROLITHOTOMY

Thomas Chi*, Manint Usawachintachit, David Tzou, Helena Chang,
Benjamin Sherer, Marshall Stoller, Stefanie Weinstein, John Mongan,
San Francisco, CA

INTRODUCTION AND OBJECTIVES: Fluoroscopic nephrostogram is commonly used to evaluate ureteral patency after percutaneous nephrolithotomy. However, it can incur a significant exposure to ionizing radiation. We have reported feasibility and safety for contrast-enhanced ultrasound nephrostogram with collecting system microbubble contrast injection to obviate the need for radiation exposure. In this study, we compared contrast-enhanced ultrasound to fluoroscopic nephrostogram in evaluating ureteral patency after percutaneous nephrolithotomy.

METHODS: After obtaining institutional review board approval for off-label use of an ultrasound contrast agent, consecutive patients with kidney stones who underwent percutaneous nephrolithotomy at our medical center were eligible for enrollment in this prospective cohort non-inferiority study. Postoperative day 1 after surgery, contrast-enhanced ultrasound and fluoroscopic nephrostogram were performed